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THE SNOWSTORM OF DECEMBER 26TH.

IT is not easy to imagine a more severe test of the discipline of the body of rainfall observers than was thrust upon them at the end of December. A very deep drifting snow puzzles even the best observers in spite of Rule XV.,* but a mixture of snow and rain is worse still; that was what came on December 26th, and I need hardly describe the interest with which I have compared the results obtained.

At present I know of no record equally well kept with that by Mr. Baldwin Latham, C.E., at Croydon, and I therefore insert it first.

"SIR,—I dare say you will be interested in the returns, which I give you below, of the heavy fall of snow on the 26th and 27th inst. as recorded in my registering rain-gauge at Croydon.

"The gauge is 4 ft. above the ground and 259 ft. above sea level.

	Time.	Inches.	
December 26th.	11.30 a.m. to 12 noon	·01	
	0 p.m. „ 1 p.m.	·025	
	1 „ „ 2 „	·01	
	2 „ „ 3 „	·03	
	3 „ „ 4 „	·01	
	4 „ „ 5 „	·05	
	5 „ „ 6 „	·075	
		———	·210 rain
	6 „ „ 7 „	·06	
	7 „ „ 8 „	·06	
	8 „ „ 9 „	·12	
	9 „ „ 10 „	·22	
	10 „ „ 11 „	·17	
	11 „ „ 12 a.m.	·235	
December 27th.	0 a.m. „ 1 „	·24	
	1 „ „ 2 „	·35	
	2 „ „ 3 „	·02	
	3 „ „ 4 „	nil	
	4 „ „ 5 „	·005	
		———	1·480 snow
		Total	1·690

* Arrangements for the Systematic Observation and Record of the Rainfall the British Isles, by G. J. Symons, F.R.S. *Gratis.*

"Probably the increased quantity recorded between one and two o'clock in the morning was partly due to an increased amount of heat which I applied to the gauge, as I found upon examination just before one o'clock, that the snow fell so rapidly as to slightly accumulate in the gauge, and I therefore started a second petroleum stove under it.

"The snow commenced to fall a few minutes before six o'clock in the evening of the 26th inst. Previous to the snow-fall there had been considerable rain during the day, viz. ·210 in. It ceased snowing at 4.20 a.m. on the 27th inst.

"In a gauge 1 ft. from the ground 1·73 in. of snow was collected, and singularly enough in an 8 in. Glaisher gauge, at the same height above the ground and the same level as my registering rain gauge, 1·405 in. was collected. It is curious that such a large quantity should be collected in this gauge, seeing that there is no great capacity for holding snow in these gauges; but in all probability this may be attributed to the fact that the temperature at the time was slightly above freezing. The gauge on the ground was completely covered at nine o'clock in the morning, the snow being 3 in. above the rim.

"I calculate, from observation in my garden, that the average depth of the snow which fell was 15 in. The snow in falling was very wet and was driven by a fierce easterly gale, so that it adhered very tenaciously to all objects with which it came in contact.

"Great destruction of trees and evergreens has occurred in my garden and in the neighbourhood, owing to the combined force of the gale and the weight of the snow.—I am, sir, yours faithfully,

BALDWIN LATHAM."

It is much too soon for me to attempt to compile an exhaustive account of the storm; all that can safely be done is to offer a few facts bearing on several aspects of the question.

Density of the Snow.—Numerous papers in this Magazine and in "British Rainfall," have shown that, as a rough average, 12 in. of snow in England will yield 1 in. of water. But the snow of December 26th and 27th, was in most places very different from ordinary snow—sticky rather than dusty—much wetter than usual, and therefore, excessively heavy. Up to the present time I have the equivalents for

Camden Square	5·7 of snow	=	1 of water
,, Road	6·8 ,,	=	1 ,,
Wallington	11·0 ,,	=	1 ,,
Hersham	6·7 ,,	=	1 ,,
West Norwood	7·5 ,,	=	1 ,,
Hartley Grange	5·7 ,,	=	1 ,,
Charlton House, Salisbury	6·7 ,,	=	1 ,,

I hope that I shall receive further information on this subject, but from the foregoing it seems evident that the snow generally was nearly twice as dense as usual.

This is very important. A cubic foot of water weighs 62½ lbs., one sixth of that is a trifle over 10 lbs.—therefore it is evident that every foot of snow weighed 10 lbs. Is it at all remarkable that so great a load broke down a few buildings, and was ruinous to trees and to telegraph wires? Take one of the latter, assume the length of span to be 100 yards, and that the wire was coated so that it became 1 in. in diameter—a low estimate—the load would then be 3600 × ·7854 = 2827 in. or 16 lbs.; if it became 2 in. in diameter it would become 64 lbs., and this, be it remembered, on one wire, and on a span of only 300 ft.; when this is applied to long spans and to posts with 10 or more wires, all surprise at the downfall of the posts ceases.

Total Depth.—It is not easy to separate the fall of rain and of snow—the latter was almost water, and the former almost ice, and the two were so mingled that it is difficult to separate them. I believe that the deepest snow was on the high lands of North Hampshire and South Berks, but it rarely exceeded 12 in. in depth except where it had drifted. The yield of rain and snow together seems over the South of England to have averaged 2 in., decreasing steadily northwards to a line from Aberystwith to the Wash, north of which it was quite insignificant.

The Hampshire Downpour.—By far the heaviest fall occurred over South Hampshire, and it is a singular coincidence that two of the Southampton observers independently arrived at practically the same maximum, viz., Red Lodge 3·160, and Highfield 3·157. I think that this local excess was chiefly rain, as gardens were turned into lakes, garden walls washed down, a chasm 15 ft. × 8 ft. cut through a road, the reservoir which supplies Netley Hospital had its bank burst, and sundry other damage occurred, all too soon to be due to melting snow. This heavy fall extended some distance, but I do not know that it exceeded 3 in. at any other stations.

How the observers have stood the test.—It is too early to speak positively, but one fact is worth many opinions. I have taken out the details for about 100 stations in the South of England, laid them down on a map and carefully examined them, 98 appeared to be correct, and two were hopelessly wrong. I think that this is ample proof of the quality of the observers, for if anything would trip up an observer it would be such a fall as this, and to catch only two failures out of 100 is certainly proof of good work.

ENORMOUS SNOWFLAKES, JANUARY 7TH, 1887.

To the Editor of the Meteorological Magazine.

SIR,—During a short snowstorm, suddenly the snowflakes were 2½ in. in length, these produced a dense snow wall 50 yards off. In two minutes they were 2¾ in., one measured 2¾ by 2½, and $\frac{3}{10}$th of an inch thick; at $12^h\ 16^m$ they had increased to 3½ in. (several 4 in., and some not caught were evidently even larger).

A minute before this storm commenced, myself and two assistants were measuring and weighing the snow of this morning's fall, and I had a number of flat circular glasses of 6 in. and 8 in. in diameter kept at the freezing point; we were, therefore, well prepared for experiments. The glasses were so cold that after sketching the outline, and placing each in a cold shed, it took after the storm was over 5 minutes in a hot-house to quite melt the snow.

The large flakes were within 12 in. of each other. When melted the largest yielded 16 drops of water, others 14 and 15. I think that I ought to have added at least another drop for what remained on the glass after no more drops would fall, but I thought that I would be within the mark. The water from seven of those flakes weighed within 2 grains of $\frac{1}{4}$ of an ounce. One flake of $3\frac{1}{2}$ in. by $2\frac{1}{2}$ in. was estimated to be $1\frac{1}{2}$ in. thick before it settled on the glass, on striking the glass it became compressed to $\frac{1}{4}$ of an inch. None of the flakes increased in size on falling on the glass. The flakes were not broken fragments, but composed of hundreds of perfect crystals, at every conceivable angle, more however horizontal than vertical.

The temp. of the air was 32°·6, and of this snow 32°·4 (taken ten minutes afterwards); the fall lasted only from 0.12 to 0.20 p.m.

I never before saw flakes anything like this, they were more than the diameter of oranges.

In the last 6 minutes one-fifth of an inch fell on the glass measure, and this yielded ·030 in. of water (*i.e.*, 1 in. of water to 6 of snow).

The flakes were divided into four classes:—(1) $3\frac{1}{2}$ inches and more; (2) 2 inches; (3) much smaller flakes; (4) very small flakes.

1.	These fell at an angle of	85°	with the velocity of 10 feet in	$1\frac{1}{4}$ seconds.
2.	,,	70°	,,	$1\frac{3}{4}$,,
3.	,,	56°	,,	$2\frac{1}{2}$,,
4.	,,	45°		much slower.

I find that the storm was at least 5 miles wide, as at Chepstow they said the flakes were the largest ever seen.

If the flakes had fallen quite perpendicularly they would I think have been even larger.—Yours truly,

E. J. LOWE.

Shirenewton Hall, near Chepstow.

COLD PERIODS.

To the Editor of the Meteorological Magazine.

SIR,—For the sixth time since our record began in 1849 I have to report 28 days consecutively below 32°, the former instances were—

1885 ...	February.	1878-9.....	December and January.
1860-1.....	December and January.	1879	December.
1870-1.....	December and January.	1886-7.....	December and January.

This is the only instance of a hard winter after a hot summer and autumn.—Yours truly,

W. LUCAS.

Hitchen, 13th January, 1887.

ROYAL METEOROLOGICAL SOCIETY.

The usual monthly meeting of this Society was held on Wednesday evening, the 15th December, at the Institution of Civil Engineers, Mr. W. Ellis, F.R.A.S., president, in the chair.

Mr. G. R. Farncombe, B.A., Mr. C. E. B. Hewitt, B.A., and Capt. S. Trott were balloted for, and duly elected Fellows of the Society.

The following papers were read :—

1. "On the Proceedings of the International Congress of Hydrology and Climatology at Biarritz," by Mr. G. J. Symons, F.R.S. This Congress was held in October, and was divided into three sections, viz., Scientific Hydrology, Medical Hydrology, and Climatology, scientific and medical. The total number of papers read was 109. An exhibition was also held in connection with the Congress. The excursions were of primary importance to the medical men, and extended over a period of three weeks. The places visited were :—Bayonne, Cambo, Dax, Arcachon, Pau, Eaux-Bonnes, Eaux-Chaudes, Cauterets, Lourdes, Bagnères-de-Bigorre, Luchon, Ussat, Ax, Montpellier, Cette, Boulou, Amèlie-les-Bains, La Preste, Banyuls-sur-mer, and Thues.

2. "Report on the Phenological Observations for 1886," by the Rev. T. A. Preston, M.A., F.R.Met.Soc. The weather was on the whole very ungenial, and everything much retarded. It was also very fatal to insect life, so that the complaints on this head have been far less than usual. Bush fruits were *very* abundant; strawberries and peas were spoilt by drought in many places ; stone fruits, except plums, were not abundant ; plums were extraordinarily plentiful, so so much so that they realized nothing in the markets, the cost of picking and carrying often being more than they realized. Apples were very poor from the destruction of the bloom by heavy rain. Hay was good and plentiful, and well harvested. Corn and other grain were not up to an average. Root crops were, as a rule, remarkably good.

3. "A Criticism of certain points of Prof. Langley's Researches on Solar Heat," by Prof. S. A. Hill, B.Sc., F.R.Met.Soc. These experiments were carried out at Mount Whitney, in Southern California, during 1881.

4. "Account of the Hurricane of March 3-4, 1886, over the Fiji Islands," by Mr. R. L. Holmes, F.R.Met.Soc. This storm was the most destructive that has ever been known to occur in the Fiji group. The lowest barometer reading was 27·54 in. at Vuna, in Taviuni. The storm was accompanied by a great wave from 18 to 30 feet in height, which swept over the land and caused an immense amount of damage. It was reported that 50 vessels were wrecked and 64 lives lost during this hurricane.

5. "Results of Meteorological Observations made at the Military Cemetery, Scutari, Constantinople, 1866-85," by Mr. W. H. Lyne. The annual mean temperature is 58°·4 ; the highest temperature registered was 103°·6 on June 22nd, and the lowest 13°·0 on January 25th, both in 1869. The mean rainfall is 29·29 in. ; the greatest fall in one day was 4·06 in. on September 25th, 1866.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1886.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute.				Average.				Absolute.		TotalRain.		Aver.
	Maximum.		Minimum.										
	Temp.	Date.	Temp.	Date.	Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	°		°		°	°	°	0–100	°	°	inches		0-10
England, London	80·2	29	40·2	5	69·6	49·2	47·1	63	92·6	36·0	·63	8	5·4
Malta	91·2	8	60·1	27	78·7	63·7	60·9	72	138·9	54·1	·07	2	2·4
Cape of Good Hope	76·3	16	39·0	24	64·8	49·0	51·5	89	...	...	7·68	13	6·4
Mauritius	78·4	7	62·2	2	75·4	65·8	59·4	70	123·7	51·4	·65	14	5·6
Calcutta	99·7	4	75·3	17	91·9	79·1	78·6	82	167·0	73·3	11·52	16	7·4
Bombay	91·8	3	75·3	30	87·4	79·4	77·1	81	147·3	74·1	43·45	21	7·5
Ceylon, Colombo	88·4	22	73·3	16	85·8	78·3	73·8	76	146·0	64·0	8·32	19	7·2
Melbourne	63·3	7	33·0	27	57·4	41·8	42·3	78	113·0	23·4	·81	12	6·4
Adelaide	68·3	8	35·6	26	61·0	44·5	42·2	68	124·3	28·3	·42	14	4·6
Wellington	64·0	23	33·0	26*a*	52·7	41·5	41·3	80	109·0	29·0	6·45	19	4·4
Auckland	63·0	4	39·0	12	57·4	46·0	46·5	83	115·0	29·0	3·03	19	6·5
Jamaica, Kingston	...	...	...	...	...	...	...	...	...	...	...	...	...
Barbados	85·0	7, 10	70·0	19	84·0	73·0	69·5	76	145·0	...	3·78	20	5·0
Toronto	81·1	16	41·3	19	71·1	51·1	52·2	73	...	32·2	1·92	12	5·3
New Brunswick, Fredericton	82·7	17	41·0	28	72·3	49·1	51·7	65	...	...	1·87	8	5·0
Manitoba, Winnipeg	91·0	30	31·3	7	77·1	46·0	51·2	67	...	...	1·21	12	4·5
British Columbia, Victoria	77·0	2	40·0	12	66·5	47·5	...	...	...	...	1·00	6	...

a And 27.

REMARKS, JUNE, 1886.

MALTA.—Mean temp. 70°·2; mean hourly velocity of wind 10·0 miles; velocity reached 37 miles per hour on 9th. On 10th, at noon, and again at 4.20 p.m., a large undulation entered the bay, the level of the water changing about five feet in about three minutes. Pressure at the time about the average, and wind S.W.; velocity 20 miles per hour. The aspect of the bay and coast is N.E. J. SCOLES.

Mauritius.—Rainfall 1·40 in. below the average; mean temp. about the average; mean hourly velocity of wind 13 miles; extremes 27·4 miles on 13th and 2·2 miles on 7th; prevailing direction E.S.E. C. MELDRUM, F.R.S.

Melbourne.—Rainfall 1·17 in., mean temp. of air 0°·3, and of dew point 1°·0, mean humidity 2, and mean amount of cloud 0·2 below average; pressure ·249 in. above average. Prevailing winds N. and S.W., strong on 4 days; heavy dew on 10 days, hoar frost on 5, fog on 2, squally on 2. R. L. J. ELLERY, F.R.S.

Adelaide.—Remarkably dry; rainfall more than two inches below the average of 29 years. Pressure very high, mean (30·361 in.) nearly a quarter of an inch above the average. Mean temp. slightly below average, but diurnal range large. The rainfall of the first six months was only 4·07 in., or 6·03 in. below the average; the least rainfall for the first half of the year ever recorded here. C. TODD.

Wellington.—On the whole a showery, unpleasant month; frequent R with S and H, especially towards the latter part. Prevailing winds S.E., S.W., and N.W., strong on six days. Rainfall 1·24 in. above, mean temp. 1°·9, and pressure slightly, below average. T on 9th; slight earthquake on 29th. R. B. GORE.

Auckland.—A cool, showery month, with little wind. Rainfall considerably below, pressure slightly above, and mean temp. about, the average. T. F. CHEESEMAN.

BARBADOS.—Mean temp. (77°·6) 1° above the average; rainfall much below the average; mean hourly velocity of wind 13·5 miles; extremes 18 miles and 10·9 miles per hour. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL, DECEMBER, 1886.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	5·02	XI.	Castle Malgwyn	...
,,	Margate, Birchington...	4·76	,,	Rhayader, Nantgwillt..	13·13
,,	Littlehampton	5·28	,,	Carno, Tybrith	9·13
,,	Hailsham	5·44	,,	Corwen, Rhug	6·32
,,	I. of W., St. Lawrence.	...	,,	Port Madoc	7·65
,,	Alton, Ashdell.....	5·96	,,	I. of Man, Douglas	7·28
III.	Winslow, Addington ...	5·53	XII.	Stoneykirk, Ardwell Ho.	4·32
,,	Oxford, Magdalen Col...	5·01	,,	Melrose, Abbey Gate...	3·48
,,	Northampton	3·89	XIII.	N. Esk Res. [Penicuick]	2·60
,,	Cambridge, Beech Ho...	3·26	XIV.	Ballantrae, Glendrishaig	5·62
,,	Wisbech, Bank House..	3·51	,,	Glasgow, Queen's Park.	3·23
IV.	Southend	...	XV.	Islay, Gruinart School..	6·32
,,	Harlow, Sheering	3·09	XVI.	St. Andrews, Pilmour Cot	2·84
,,	Rendlesham Hall	4·16	,,	Balquhidder, Stronvar..	5·96
,,	Diss	3·38	,,	Dunkeld, Inver Braan..	2·61
,,	Swaffham	4·02	,,	Dalnaspidal H.R.S. ...	4·48
V.	Salisbury, Alderbury...	6·15	XVII.	Keith H.R.S.	3·23
,,	Warminster	6·07	,,	Forres H.R.S.	2·17
,,	Calne, Compton Bassett	6·00	XVIII.	Strome Ferry H.R.S....	8·27
,,	Ashburton, Holne Vic..	10·71	,,	Tain, Springfield.....	2·02
,,	Holsworthy, Clawton...	5·83	,,	Loch Shiel, Glenaladale	11·26
,,	Hatherleigh, Winsford.	4·37	,,	S. Uist. Ardkenneth ...	5·98
,,	Lynmouth, Glenthorne.	6·24	,,	Invergarry	7·77
,,	Probus, Lamellyn	7·08	XIX.	Lairg H.R.S.	...
,,	Wincanton, Stowell Rec.	6·76	,,	Forsinard H.R.S.	5·51
,,	Taunton, Lydeard Ho...	6·38	,,	Watten H.R.S.	3·52
,,	Wells, Westbury.....	4·96	XX.	Dunmanway, Coolkelure	8·25
VI.	Bristol, Clifton	5·18	,,	Fermoy, Gas Works ...	3·56
,,	Ross	4·43	,,	Tralee, Castlemorris ...	6·82
,,	Wem, Sansaw Hall.....	...	,,	Tipperary, Henry Street	5·31
,,	Cheadle, The Heath Ho.	3·97	,,	Newcastle West	...
,,	Worcester, Diglis Lock	4·11	,,	Miltown Malbay.....	5·72
,,	Coventry, Coundon	3·52	XXI.	Gorey, Courtown House	3·82
VII.	Melton, Coston	3·85	,,	Navan, Balrath	3·00
,,	Ketton Hall [Stamford]	4·18	,,	Mullingar, Belvedere ...	4·21
,,	Horncastle, Bucknall ...	3·45	,,	Athlone, Twyford	3·46
,,	Mansfield, St. John's St.	4·17	XXII.	Galway, Queen's Coll...	4·28
VIII.	Macclesfield, The Park.	4·84	,,	Clifden, Kylemore	6·85
,,	Walton-on-the-Hill.....	4·58	,,	Crossmolina, Enniscoe..	9·04
,,	Lancaster, South Road.	5·29	,,	Collooney, Markree Obs.	6·68
,,	Broughton-in-Furness ..	7·36	,,	Carrick-on-Shannon ...	5·63
IX.	Wakefield, Stanley Vic.	3·25	XXIII.	Rockcorry.....	5·39
,,	Ripon, Mickley	3·97	,,	Warrenpoint	4·40
,,	Scarborough.....	4·07	,,	Newtownards	3·71
,,	East Layton [Darlington]	3·32	,,	Belfast, New Barnsley..	6·73
,,	Middleton, Mickleton ..	4·29	,,	Cushendun	7·25
X.	Haltwhistle, Unthank..	5·37	,,	Bushmills	4·82
,,	Shap, Copy Hill	8·02	,,	Stewartstown	4·11
XI.	Llanfrechfa Grange	6·04	,,	Buncrana	5·87
,,	Llandovery	7·91			

DECEMBER, 1886.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	4·34	+ 2·17	1·82	26	18	53·9	6	19·7	20	18	26
II.		Maidstone (Hunton Court)...	4·92	+ 2·52	2·12	26	20	...	...	...	...	...	...
,,		Strathfield Turgiss	4·14	+ 2·12	1·18	26	15	54·0	7	16·7	31	19	27
III.		Hitchin	4·20	+ 2·15	1·27	26	18	53·0	6	15·0	31	19	...
,,		Banbury	4·89	+ 2·74	1·00	26	23	51·0	6	18·0	20	19	...
IV.		Bury St. Edmunds (Culford)	3·16	+ 1·01	·81	26	17	53·0	6	15·0	2*a*	23	...
,,		Norwich (Cossey)	...	...	...	...	...	...	...	...	...	...	...
V.		Weymouth(LangtonHerring)	6·24	...	1·82	26	21	53·0	6	24·0	20*b*	13	...
,,		Barnstaple	7·16	+ 3·40	1·36	26	22	54·0	6	17·0	21	...	...
,,		Bodmin	6·36	+ ·91	1·26	26	27	52·0	6	20·0	21	8	19
VI.		Stroud (Upfield)	3·90	+ 1·47	1·36	26	20	48·0	5, 7	19·0	31	22	...
,,		ChurchStretton(Woolstaston)	4·51	+ 1·72	·70	8	21	51·0	5, 6	23·0	18	18	29
,,		Tenbury (Orleton)	3·57	+ 1·06	·78	26	21	56·0	6	15·8	21	19	23
VII.		Leicester	3·67	...	·89	14	19	53·5	5	18·5	21	15	30
,,		Boston	3·11	+ 1·04	·91	14	15	52·0	6	18·0	20	19	...
,,		Hesley Hall [Tickhill].....	3·77	...	·80	14	17	52·0	5	18·0	21	18	...
VIII.		Manchester (Ardwick).....	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	3·52	+ 1·31	·60	13	13	...	...	...	...	...	...
,,		Skipton (Arncliffe)	9·06	+ 3·78	1·60	11	21	49·0	5	14·0	20	15	...
,,		Hull (Beverley Road)	3·50	+ 1·03	1·12	14	22	50·0	5	20·0	18	19	28
X.		North Shields	3·36	+ ·27	1·03	11	15	54·5	5	15·5	21	24	26
,,		Borrowdale (Seathwaite).....	18·62	+ 4·89	2·48	3	22	44·9	10	17·5	18	5	...
XI.	WALES.	Cardiff (Ely).....	6·60	+ 2·69	·95	26	21	...	...	...	...	...	...
,,		Haverfordwest	6·56	+ 1·43	·88	7	21	52·0	5, 6	11·0	20	16	26
,,		Plinlimmon (Cwmsymlog) ...	6·30	...	·81	6	20	...	...	...	...	...	...
,,		Llandudno.....	4·04	+ 1·19	·76	6	25	...	...	25·5	21	8	...
XII.	SCOTLAND.	Cargen [Dumfries]	5·10	+ ·57	·82	21	18	52·0	6	7·2	21	17	...
,,		Jedburgh (Sunnyside).....	3·29	+ ·84	·69	23	17	52·0	5	5·0	21	24	...
XIV.		Douglas Castle (Newmains)	...	...	...	...	...	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory).....	6·19	+ ·01	·74	7	20	...	...	...	...	...	...
,,		Oban (Craigvarren)	5·36	...	·53	21	22	51·3	5	22·3	20	15	...
,,		Mull (Quinish).....	8·53	...	1·52	21	20	...	...	...	...	...	...
XVI.		Loch Leven Sluices	4·20	+ ·54	·80	23	15	...	...	...	...	...	...
,,		Arbroath	2·37	— ·53	·80	22	16	46·0	6	19·0	21	23	...
XVII.		Braemar	1·77	— 1·66	·36	5	17	45·8	5	0·0	27	27	31
,,		Aberdeen	4·23	...	·89	22	20	43·0	5, 6	12·0	19*c*	25	...
XVIII		Lochbroom	8·86	...	1·44	8	28	...	...	...	...	...	...
,,		Culloden	2·56	+ ·72	...	...	...	49·0	5	20·0	3*d*	20	31
XIX.		Dunrobin	...	...	...	...	...	...	...	...	...	...	...
,,		Kirkwall (Swanbister)..... ..	6·14	...	·89	8	29	47·1	5	21·1	20	...	19
XX.	IRELAND.	Cork (Blackrock)	4·38	— ·38	·78	7	19	56·0	5	19·0	20	14	...
,,		Dromore Castle	7·50	...	1·22	21	20	58·0	1	23·0	20	...	...
,,		Waterford (Brook Lodge) ...	5·60	...	·94	14	18	55·0	5	17·0	21	16	...
,,		Killaloe	5·66	...	1·42	21	22	51·0	13	24·0	19*e*	17	...
XXI.		Carlow (Browne's Hill)	3·35	— ·16	·68	8	19	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·35	+ ·77	·73	14	21	53·2	6	22·0	21	12	29
XXII.		Ballinasloe	4·51	+ 1·03	·78	21	22	49·0	9	15·0	20	24	...
XXIII		Waringstown	5·61	+ 2·65	1·70	8	22	53·0	5	10·0	19	24	28
,,		Londonderry (Creggan Res.).	6·27	...	·52	18	29	...	...	...	...	...	...
,,		Omagh (Edenfel)	5·08	+ 1·68	·52	18	25	53·0	5	7·0	19*g*	24	28

a And 21, 31. *b* And 21. *c* And 20. *d* And 19, 20, 27. *e* And 20. *f* And 21. *g* And 20.

+ Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON DECEMBER, 1886.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—December was exceptionally cold and stormy. In the early part of the month the temp. was low, and a very violent gale and TS occurred on the 8th; heavy R marked the second week; in the third week great cold prevailed, with another heavy gale and S storm on the 26th.

HITCHEN.—The heaviest fall of S ever experienced here occurred on the 26th, preceded and followed by much L; it nearly all fell between 5.30 p.m. and 10.30 p.m., and yielded 1·27 in.

BANBURY.—Mean temp. 34°·5; H on 1st and 8th; S on 8th, 9th, 22nd and 26th; high wind on six days, fog on two.

CULFORD.—Very changeable, with dense fogs, heavy S storms and high winds.

LANGTON HERRING.—A month of very unsettled weather. Rainfall the heaviest in any month since 1877, with the exception of October, 1882. Mean temp. at 9 a.m. 2°·0 below the average of 14 years. The changes of temp. were sudden and great; at 9 a.m. on 21st it was 24°, at 9 a.m. on 22nd, 44°. There was a severe storm on the 8th and 9th, when pressure was very low for many hours. Another storm, with heavy S, occurred on the night of the 26th, when several trees were uprooted or snapped in two.

BODMIN.—Mean temp. 38°·2. On the 28th a severe TS occurred at 8.15 p.m.; a colt was killed by L at Trescowe, four miles from here, and another very much injured. S on 17th, 18th and 19th, and a little S, which melted directly, on 26th.

STROUD.—N.W. gale on 6th; S.W. by W. gale at night on 7th; severe S.W. gale with T, L and H on 8th; L on 12th and 18th; S about four inches deep on 26th, with more on the hills; fog on four days.

WOOLSTASTON.—The early part of the month was very stormy. There was a strong gale on the 8th and 9th, with L and H, and a remarkable and long-continued barometric depression, the lowest reading ever observed occurring about 9 p.m. on the 8th. The remainder of the month was cold, with sharp frost. S on 1st and 26th. Mean temp. 35°·3.

ORLETON.—The weather was very changeable throughout, with rainfall much above the average, and few dry days. The frost was severe on the first five days, and on the 6th temp. rose to 56°; this was followed by the greatest barometric depression that I have ever registered in 60 years. About 7 p.m. on the 8th the bar. stood at 27·83 in. (uncorrected), which was nearly a tenth of an inch lower than on the 13th January, 1843. S on the hills and floods in the river followed; frost then set in again, and continued severe at times till the end of the month. On the 26th, after frost, small R set in at 8.30 a.m., changing to S about 1.30 p.m, and covering the ground three inches deep before midnight. Severe frost followed, and on the 31st there was a dense fog. L on 18th.

HULL.—A cold month, with ground frost nearly every night; pressure exceptionally low on the 8th.

WALES.

HAVERFORDWEST.—One of the coldest, wettest, and most stormy Decembers in my record of 37 years. The damage done to forest trees during the great storm of the 7th and 8th perhaps exceeds anything in living memory; the pressure was the lowest I ever recorded in this locality. Severe frost prevailed from 15th to 21st, when a sudden and complete thaw set in, which by the sudden melting of the S, caused one of the highest floods remembered. Mean temp. 35°·5. H, R and sleet on 6th. S on five days.

LLANDUDNO.—A month memorable for its storms. A gale of unprecedented

severity from W.S.W. to W. swept over the country during the night of the 7th and the following day; this was preceded and accompanied by frequent heavy showers of R, and though no S fell here, the distant mountains were capped with it. Showers of H and S had fallen on 1st, 2nd, and 3rd, coating the mountains for the first time this winter. The gale was equal to anything of the kind I have ever experienced at Llandudno, and in the whole course of my life I never saw the pressure fall so low and so rapidly. The heavy S storm which visited the metropolis and the south of England on the night of the 26th, we happily escaped at Llandudno; also the severe cold which prevailed about the end of the month in many parts of both England and Scotland. There were only 8 frosty nights. The mean temp. (40°·4) was 2°·1 below the average, and the monthly range (27°·5) and daily range (8°·3) were both within a fraction of the average. There was a marked deficiency of sunshine.

SCOTLAND.

CARGEN.—The month was remarkable for sudden and great fluctuations of pressure and temperature. The lowest pressure ever recorded here was observed on the 8th, notwithstanding which the weather was in no way remarkable, the force of the wind not being more than 3 (scale 0 to 10), and the rainfall by no means excessive. A hard frost set in on the 17th, the temp. on the night of the 20th falling to 7°·2; at 9 a.m. on the 21st, the thermometer registered 11°, and at 9 p.m. it had risen to 41°. Mean temp. (34°·2), 4°·6 below the average. Gale on 1st; S showers on 1st and 7th; S (three inches deep) on 19th.

JEDBURGH.—Temperature low throughout. The S fall was much greater here than in the adjoining counties. After the 20th the fall was slight.

OBAN.—The coldest December since 1880, with a considerable preponderance of N. wind; consequently the air was unusually dry, and the heavy gales mostly travelled southward of this station. On the 8th, pressure was exceedingly low, with a heavy N. gale and L. S on six days.

BRAEMAR.—A very cold, unsettled month. Pressure on the 8th, the lowest recorded in this district.

ABERDEEN.—While the number of rainy days was not excessive, the rainfall was about an inch above the average, owing to five separate heavy falls of R and S. Temp. very low. Pressure on the 8th, the lowest recorded here, with the exception of the night of 26th January, 1884.

LOCHBROOM.—We have had no such severe storms, hard frost, or deep S in this district since 1879, and not previously since 1849. The month, on the whole, was one continued storm of S, H, R, sleet, frost, and L. Great distress prevailed among flocks depending on hill pasture and all around here.

CULLODEN.—A severe month, frost prevailing and S covering the ground throughout. Farm work at a standstill.

SWANBISTER.—Windy and wet; frosty at the close; with only 28 hours of sunshine, nearly half of which occurred during the last week. S, sleet, and H were frequent.

IRELAND.

BLACKROCK.—Mostly dull, damp, and misty, with a strong gale on 7th and 8th. Mean temp. 38°·9.

KILLALOE.—A great storm occurred on 8th, with very low pressure, the period of greatest violence being from 10 a.m. to 1 p.m. There were some sharp frosts, and T and L were frequent.

DUBLIN.—A cold month, the weather being especially unsettled and changeable. Pressure exceptionally low on 8th. Mean temp. 3°·4 below the average. Solar halos on 2nd, 13th, and 25th; H on 8th, 16th, and 20th. S or sleet on 7 days, fog on 9, high wind on 16, gales on 4 days. Mean humidity 88, mean amount of cloud 5·3; prevailing winds W. and W.N.W.

WARINGSTOWN.—The lowest pressure ever recorded here occurred on the 8th.

EDENFEL.. The most severe and inclement December for many years, with

remarkable barometric and thermometric depressions, and S and R much above the average in frequency and amount. On the 8th we were here in the very centre of a barometric depression—unprecedented, so far as I can ascertain, and lower than even that of January 26th, 1884. The lowest point was touched at 2 p.m., when a dead calm prevailed, nor was there any atmospheric disturbance till 1 a.m. next morning. On the 20th, after a snowfall of 13 inches in the previous two days, a remarkable cold wave passed over this district. R was falling at 6 a.m., within two hours of which the shade temp. had fallen to 7°, and at 5 the same evening 1° was registered on the surface of the S, after which the cold wave gradually passed away; 17° being reached at 10 p.m., and 35° at 9 a.m. next morning.

THE RECENT SUMMER AND THE WEATHER CYCLISTS.

To the Editor of the Meteorological Magazine.

SIR,—I am sorry that Mr. Brumham should have felt aggrieved by my letter which you were good enough to insert in your Magazine for December.

Mr. Brumham seems to forget that the freedom of thought and utterance for which he pleads has two sides to it, and that if it involves, as I fully admit that it does, the right to publish to the world any speculations, however extravagant or unfounded they may be, it involves also the right to criticise such speculations, and to bring them to the test of facts. And this is all that I did in reference to his predictions in your Magazine for last June.

Mr. Brumham predicted that the summer would be "a warm one of long duration," and that it would "give us some periods of excessive heat." I showed by statistics compiled from about 80 stations reporting to the Meteorological Office that the summer had, on the whole, been a cool one; that, inasmuch as, with the exception of about a week at the beginning of July, there had been no warm weather up to the middle of August, it could not be said to have been of "long duration," and that there had been no periods of excessive heat.

What has Mr. Brumham to say in answer to all this? His letter, which purports to be a reply to my criticisms, consists almost entirely of a number of wholly irrelevant statements as to the general similarity of the weather of last year to that of the year 1869, a point upon which I had not expressed any opinion. Here, for instance, are a few examples:—"March was remarkably cold to the 19th." "In March and April rain fell on 27 days, to the amount of 2·4 inches." "May was remarkably wet." Total rainfall in May and June 4·7 in.," &c., &c., &c. What, in the name of common sense, have these statements to do with the question as to which Mr. Brumham and myself are at issue?—"Was the late summer a hot summer of long duration?" The only facts at all relevant to the question at issue which Mr. Brumham adduces are certain high maxima registered by the sheltered thermometer at Greenwich, and these are quoted under a misapprehension. For Mr. Brumham does not seem to be aware that, owing to the defective exposure of the

instrument, the readings of the shaded thermometers at Greenwich in bright summer weather are sometimes several degrees in excess of the true reading. I am sure Mr. Brumham will thank me for quoting, for his information on this point, some remarks from the recently published "Report on the Temperature and the Rainfall of the Croydon District, 1881–85," by Mr. Storks Eaton:—"At the Royal Observatory, Greenwich, another important and more potent factor comes in. There it seems that the recorded maximum temperatures are vitiated by the character of the thermometer stand. . . . . In fact, in bright weather in the height of summer, the maximum temperature, as recorded at the Royal Observatory, sometimes exceeds by several degrees that observed anywhere else in the neighbourhood." So that when I mentioned 87° as the highest authentic shade-temperature recorded last summer, I was probably not far from the truth. [The *very* apocryphal reading of 95° said to have been registered at Boston may safely be treated as a "*quantité négligeable.*"] The only really exceptional heat, for the season, experienced during the past year was in the first fortnight in October. Mr. Brumham naturally makes the most of this, as a drowning man will catch at a straw. But even granting the widest possible latitude that can be claimed for the term "summer," I must decline to admit that October can properly be included amongst the summer months.

In the concluding paragraph of his letter Mr. Brumham places me before your readers in the light of a Grand Inquisitor, who, if he could, would "torture him into confessing, on his knees, that the weather does not move in cycles." I am sorry to deprive him of the luxury of posing as a nineteenth-century Galileo, but he must allow me to assure him that, so far am I from wishing to interfere with his investigations and his claim to assume the mantle of a weather prophet, that the more of such predictions we have from him, the better shall I be pleased, being convinced as I am that the more such speculations are ventilated, the sooner will their futility be demonstrated, and the nearer we shall be to the time when the time and labour now wasted in illusory speculations will be devoted to researches from which we may hope for solid and durable fruit.

G. T. RYVES, F.R.Met.Soc.

Tean Vicarage, Jan. 7th, 1887.

END OF VOL. XXI.